Surveying Important Questions PDF

Surveying exams usually test five areas: basics with chain and compass surveying, levelling, theodolite and traversing, tacheometry with curves, and modern tools such as total station, GPS and GIS. Practise bearing conversion, curvature and refraction correction, traverse adjustment, curve setting and area calculation, because these numericals appear in most university syllabi. Use these questions for practice and check your own university syllabus and official papers.

Key takeaways

- These are practice questions based on common syllabus topics. They are not verified past papers.
- Each unit has definitions, derivations and numericals with short answer outlines.
- Numericals on levelling, traverse closing error and simple curves carry the most marks in many papers.
- Draw neat sketches for every derivation. Surveying examiners reward labelled diagrams.
- Check your own university syllabus, because unit order and topics differ between universities.

Before you start: how to use these questions

These questions follow the topics found in a standard Indian B.Tech Civil Surveying syllabus (often split into Surveying I and II). They are practice questions, not questions copied from any exam. Always match them against your own university syllabus and official question papers. AKTU students can use the AKTU old question paper archive, and Uncodemy keeps a list of previous year question paper sources. Keep a scientific calculator handy for trigonometric steps.

Unit 1: Fundamentals, chain and compass surveying

Definitions (2 to 3 marks)

- Define surveying. State the difference between plane and geodetic surveying.
- What is the principle of "working from whole to part"? Why is it followed?
- Define whole circle bearing (WCB) and reduced bearing (RB).
- What is local attraction? How is it detected?
- Define magnetic declination and dip.

Long answers

- Explain the classification of surveys based on purpose, instrument and method.
- Describe the errors in chaining and the corrections for wrong length of chain, slope, temperature and pull.

- Compare the prismatic compass and the surveyor's compass.

Numericals

1. Convert WCB 210°30' into reduced bearing. *Outline:* the line is in the third quadrant, so RB = 210°30' − 180° = S 30°30' W.
2. The bearings of a closed traverse are given with one station affected by local attraction. Find the corrected bearings. *Outline:* find a line whose fore and back bearings differ by exactly 180°; its end stations are free from attraction. Correct the other stations step by step from there.
3. A 20 m chain was found 10 cm too long after measuring a distance of 500 m. Find the true distance. *Outline:* true length = (L'/L) × measured length = (20.1/20) × 500 = 502.5 m. If the error grew gradually, use the average chain length instead.

Unit 2: Levelling and contouring

Definitions

- Define datum, benchmark, reduced level, back sight, fore sight and change point.
- What is a contour? State four characteristics of contours.
- What is reciprocal levelling and when is it used?

Derivations and theory

- Derive the combined correction for curvature and refraction. *Outline:* curvature correction = $d^2/2R$; refraction is taken as 1/7 of curvature; combined correction = 0.0673 d^2 m, with d in km, and it is subtractive.
- Derive the formula for true difference in level by reciprocal levelling: true difference = [(ha − hb) + (ha' − hb')] / 2.
- Explain the rise and fall method and the height of instrument method, with arithmetic checks.

Numericals

1. Find the combined correction for a sight of 2 km. *Outline:* 0.0673 × 2^2 = 0.269 m.
2. Given a staff reading table, compute reduced levels by the rise and fall method and apply the arithmetic check: ΣBS − ΣFS = ΣRise − ΣFall = Last RL − First RL.
3. Calculate the distance of visible horizon for an observer 9 m above sea level. *Outline:* d = 3.855 √h km = 3.855 × 3 = 11.57 km.

Unit 3: Theodolite surveying and traversing

Definitions

- Define face left, face right, transiting and swinging.
- What are the fundamental lines of a transit theodolite? State their relationships.
- Define latitude, departure, closing error and relative precision.

Long answers

- Explain the method of repetition and the method of reiteration for measuring horizontal angles.
- State the permanent adjustments of a theodolite.

- Explain the Bowditch rule and the transit rule for balancing a traverse. When is each one used?

Numericals

1. In a closed traverse, the sum of latitudes is +0.30 m and the sum of departures is -0.40 m. The perimeter is 1000 m. Find the closing error and its precision. *Outline:* closing error = $\sqrt{(0.30^2 + 0.40^2)}$ = 0.50 m; relative precision = 0.50/1000 = 1 in 2000.
2. Balance a four-sided traverse using the Bowditch rule. *Outline:* correction to latitude of a line = total error in latitude × (length of line / perimeter). Do the same for departures and tabulate consecutive and independent coordinates.
3. Compute the area of a closed traverse from coordinates. *Outline:* use the coordinate (shoelace) method and show the table clearly.

Unit 4: Tacheometry, curves and areas

Definitions

- What is tacheometry? Define multiplying constant and additive constant.
- What is an anallactic lens and why is it used?
- Define a simple, compound, reverse and transition curve. Define degree of curve.

Derivations

- Derive the tacheometric distance formula for a horizontal line of sight: $D = Ks + C$.
- Derive the elements of a simple circular curve: tangent length $T = R \tan(\Delta/2)$, length of curve $L = \pi R\Delta/180$, long chord $= 2R \sin(\Delta/2)$, apex distance $= R[\sec(\Delta/2) - 1]$.
- Explain Rankine's method of tangential angles for setting out a curve.

Numericals

1. With K = 100 and C = 0, the staff intercept on a horizontal sight is 1.250 m. Find the distance. *Outline:* D = 100 × 1.250 = 125 m.
2. Two straights meet at a deflection angle of 40°. A curve of radius 300 m joins them. Find the tangent length, curve length and long chord. *Outline:* T = 300 × tan 20° = 109.19 m; L = π × 300 × 40/180 = 209.44 m; long chord = 600 × sin 20° = 205.21 m.
3. Offsets at 10 m intervals are 0, 2.5, 3.5, 5.0, 4.6, 3.2 and 0 m. Find the area by the trapezoidal rule and Simpson's rule. *Outline:* trapezoidal = 10 × [(0 + 0)/2 + 18.8] = 188 m²; Simpson's = (10/3) × [0 + 4(10.7) + 2(8.1)] = 196.67 m².

Use the unit converter if a question mixes hectares, acres and square metres.

Unit 5: Modern surveying

Definitions

- What is a total station? List its main functions.
- Define EDM and explain the phase comparison principle in brief.
- What is GNSS? Name the main global systems and India's NavIC.
- Define remote sensing, spatial resolution and GIS.

Long answers

- Explain how a total station is used for traversing and data download to a computer.
- Describe the segments of GPS (space, control and user) and the sources of error.
- Explain photogrammetry: vertical photographs, scale of a photograph and relief displacement.

Numerical

- A vertical photograph is taken at a flying height of 3000 m above ground with a camera of focal length 150 mm. Find the scale. *Outline:* scale = f/H = 0.15/3000 = 1 in 20,000.

How to score well in Surveying

- **Learn the formula sheet by unit.** Write formulas for corrections, curves and tacheometry on one page and revise it daily in the last week.
- **Show tables.** Levelling and traverse answers need neat tables with arithmetic checks. Marks are often given for the check line.
- **Draw before you write.** A sketch of the traverse, curve or levelling set-up earns marks even if a calculation step slips.
- **State units and sign.** Say whether a correction is additive or subtractive.
- **Do the short questions first.** Definitions are quick marks and build confidence.
- **Practise from official papers.** After these practice questions, solve at least three past papers from your own university under timed conditions.

Frequently asked questions

Are these Surveying questions from past university papers?

No. They are practice questions based on topics common to most B.Tech Civil Surveying syllabi. Check your own university syllabus and official question papers before the exam.

Which units of Surveying carry the most numericals?

Levelling, traversing and curves usually have the most numericals. Tacheometry and area calculation also appear often.

Where can I find official AKTU Surveying papers?

AKTU publishes old question papers on its website at aktu.ac.in/old-question-paper.html. Other universities have their own archives.

How should I prepare for Surveying in one week?

Revise the formula sheet, solve one unit's numericals each day, practise traverse and levelling tables, and finish with one timed past paper from your university.

Is a scientific calculator allowed in Surveying exams?

Most universities allow a non-programmable scientific calculator. Confirm the rule in your exam instructions.

Is this PDF free?

Yes. Fill in the short form on this page and the PDF downloads right away.

Sources and further reading

- AKTU old question papers
- NPTEL: Surveying courses (IIT faculty)
- Survey of India
- ISRO Bhuvan geoportal

About this PDF

Prepared by the Uncodemy team as practice material based on common syllabus topics. These are not past papers. Corrections: info@uncodemy.com.

More free resources and courses: uncodemy.com | info@uncodemy.com | +91 98183 66550